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Maintenance Rations
For Breeding Ewes

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MAINTENANCE RATIONS FOR BREEDING EWES

BY

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B. S. University of Tennessee, 1904

THESIS

For the Degree of

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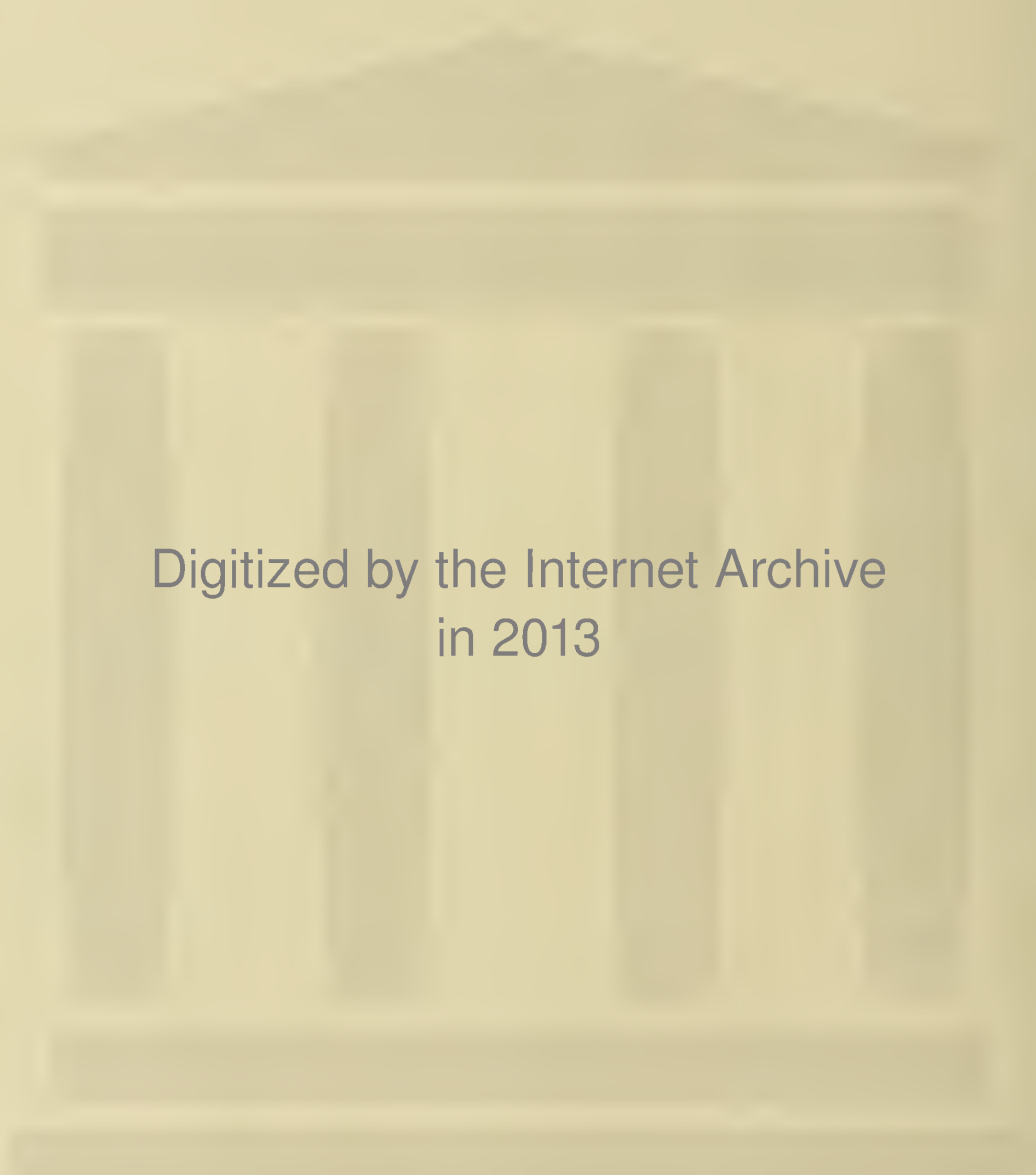
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INTRODUCTION

In Southern States with long summer seasons and the winters relatively open, stock of all kinds are allowed access to the pastures a greater part of the year. Under such conditions the art of feeding is reduced almost to a minimum, but coming farther north, where the winters are more severe, land is higher in price - using average values of course, and must have a greater carrying power than can be attained by pasturing. Crops giving large returns must be grown and dealt out according to the needs of our animals. The latter is exceedingly necessary since our common feed stuffs have reached prices causing some uneasiness on the part of the feeder when he confronts the problem of fitting stock for market. Even taking into account the information derived from investigation along lines of mutton production which has been put in the hands of the farmer, one is safe in saying that he is laboring against odds when attempting to market hay and grain at current prices in the form of live mutton. Such conditions cannot long exist; the farmer must look more carefully into every item relative to the cost of production.

Where it is necessary to maintain breeding sheep a part of each year without the aid of pasture, the flock owner should have a pretty definite idea of the amount and kind of feed required for supporting the ewes. The kind of feed which may be used is especially important since on many farms there is much coarse material going to waste which might afford excellent

provender during the winter months. It is the utilization of the by-products of the farm that recommends the sheep so strongly to every farmer.

At the present time there is no record of any work having been done to determine the amount of feed necessary to maintain a breeding ewe. In the Pennsylvania Station Report for 1901 is reported a maintenance ration for sheep but these were not breeding ewes. The Wisconsin Station has reported the results of several experiments comparing different feeds in a winter ration for breeding ewes, while the Iowa Experiment Station has reported an experiment comparing the relative feed requirements for seven breeds over a period of seven weeks during the winter of 1891-92.

OBJECT OF EXPERIMENT

The object of the experiment was to compare three of the most common forms of roughage found on Illinois farms for the maintenance of breeding ewes, when fed in connection with shelled corn, cottonseed meal and corn silage. Two of the feeds used are regarded as by-products of the farm, while the third was clover hay which is the most available roughage in Illinois. The nature of the feeds selected caused a wide variation in the nutritive ratio of the different rations. When clover hay and cottonseed meal are in the same ration, the nutritive ratio cannot be kept sufficiently wide to agree with an economic maintenance ration which has thus far been determined with breeding cows. The effect of the clover hay ration compared to the straw

and stover ration upon the thrift and appetite of the ewes was carefully noted. The birth weight of the lambs and the behavior of the ewes at lambing time were also taken into account in determining the efficiency of the different rations.

PLAN OF EXPERIMENT

Fifteen grade Shropshire ewes bred to lamb late in March were purchased for this experiment. There were 3 three year old and 12 yearling ewes in the flock. They were uniform in quality and condition and would grade on the market as good to choice. The yearlings were not mature and consequently not well suited to this kind of investigation but were the best that could be obtained.

They were bought near Bloomington, Illinois, and reached the station farm December 1, 1908. They came right out of the field and were very timid; a few ewes failed to get acquainted with the feeder until the experiment was well under progress. Upon arrival at the sheep barn the ewes received a ration of $1\frac{1}{2}$ pound corn and oats, equal parts, and $1\frac{1}{2}$ pounds clover hay per head daily until January 5th when one-half of the hay was replaced with oat straw and the grain changed to $\frac{2}{3}$ corn and $\frac{1}{3}$ oats. This ration was fed until January 9th.

January 4th the ewes were divided into three uniform lots containing 1 three year old ewe and 4 yearlings. The

ewes were so badly infested with ticks that it was thought best to put them through the dipping tank. This was done January 4th on a very pleasant winter day, but by the next morning there was a decided drop in temperature and in spite of the warm quarters, the fleeces remained too icy to weigh until January 8th; at which time the ewes were put into the pens which they were to occupy during the experiment and weighed every morning before feeding until January 15th. Lot 1 contained ewes with ear labels numbering 247, 248, 249, 164, 165. Lot 2 had the numbers 241 to 245 inclusive, and Lot 3 was numbered thus: 140, 141, 142, 373, 374. During the experiment weights were taken every Monday, Wednesday and Friday morning before feeding and watering. Weighings were made three consecutive mornings at the beginning and end of the experiment and the average of these weights were taken as initial and final weights respectively.

January 9th the ration was changed to .5 pound of grain containing 4 parts corn and 1 part oats. Silage was introduced at this time beginning with .3 pound per head daily and gradually increasing until January 18th when one pound was readily eaten. As the silage was being increased, the clover hay, oat straw and corn stover were reduced to what should constitute the trial ration. Cottonseed meal was not secured until January 14th and by gradually increasing one week was required for it to supplant the oats in the ration. The cottonseed meal was fed throughout the experiment at a constant

quantity and in very small amount - less than one pound per thousand pounds live weight. Whenever it is fed in any considerable amount in a maintenance ration, the protein and ether extract immediately get far in excess of the supposed requirements of these nutrients. Furthermore cottonseed meal is not considered by good feeders to be a safe feed for breeding animals.

The feeds eaten by the various lots are as follows:

- Lot 1. Corn, cottonseed meal, silage, and clover hay.
- Lot 2. " " " " " oat straw.
- Lot 3. " " " " " corn stover.

The corn was shelled and in excellent condition while the cottonseed meal would not grade as prime. In the first place it was not 1908 meal and was off in quality. It also contained a considerable amount of ground hulls which increased the crude fiber, thereby lowering the percentage composition and digestibility of its nutrients. The Silage was first class throughout the experiment. It contained 16.5 per cent grain, but no account was taken of this when calculating the digestible nutrients but was considered when getting proportion of concentrates to roughage. The clover hay was choice and while there was a waste of 19 pounds from the 512 pounds fed this represents chiefly the foreign matter such as corn-stalks. The oat straw, while free from any appearance of mold, was of only medium quality and the same was true of the corn stover. Care was exercised to keep the stover free from grain.

The experiment began January 13th and continued until March 16th, a period of nine weeks. The trial ration consisted of the following per head daily:

Lot 1. .4# grain, 1# silage, 1.2# clover hay.

Lot 2. .4# grain, 1# silage, 1.3# oat straw.

Lot 3. .4# grain, 1# silage, 1.5# corn stover.

The grain consisted of 4 parts corn and 1 part oats. The oats were replaced by cottonseed meal after January 21st.

A maintenance ration for breeding ewes should not only maintain the body weight but should yield sufficient gain to account for the weight of the fetus developed. The gains allowed for fetal development will be discussed under the table showing the gains made by different lots.

It was expected that the sheep would not respond at once to the feed owing to the change from the field to the barn, and again the cold^{weather}/following the dipping was sufficient cause to interfere with the general condition of the ewes for a few days. This is what happened but was apparently due to insufficient nutrients, since in no case is a gain recorded where less than 6 pounds of digestible nutrients per 100 pounds live weight per week were consumed. On the other hand, there is but one loss recorded when as much as 6.5 pounds of digestible nutrients per 100 pounds live weight per week were consumed and this was with Lot 2 during the fourth week, yet there was no apparent digestive disturbance with any individual in this lot at this time. When the experiment started,

some trouble was experienced from scours but no definite cause could be attributed for the disturbance.

TABLE I

Average Feed Consumed per Head per Day by Periods

Lot 1

Periods	Shelled	Cotton-	Corn	Clover Hay		
	Corn	seed	Silage	Consumed	Waste	Per cent
	Pounds	Meal	Pounds	Pounds	Pounds	Waste
Jan.13 to Jan.26	.32	.08	.91	1.21	.01	0.8
Jan.27 to Feb.9	.32	.08	1.00	1.32	.03	2.2
Feb.10 to Feb.23	.32	.08	1.00	1.69	.07	4.0
Feb.24 to Mar.9	.32	.08	1.00	1.80	.09	4.7
Mar.10 to Mar.16	.32	.08	1.00	2.08	.14	6.3
Average	.32	.08	1.00	1.56	.06	3.7

Lot 2

Periods	Shelled	Cotton-	Corn	Oat Straw		
	Corn	seed	Silage	Consumed	Waste	Per cent
	Pounds	Meal	Pounds	Pounds	Pounds	Waste
Jan.13 to Jan.26	.32	.08	.91	1.10	.23	17.3
Jan.27 to Feb. 9	.38	.08	1.18	1.38	.33	19.3
Feb.10 to Feb.23	.40	.08	1.24	1.59	.72	32.1
Feb.24 to Mar. 9	.54	.08	1.24	1.54	.91	37.1
Mar.10 to Mar.16	.78	.08	1.24	1.23	1.37	52.7
Average	.45	.08	1.15	1.38	.64	31.6

TABLE I (continued)

Average Feed Consumed per Head per Day by Periods

Lot 3

Periods	Shelled	Cotton-	Corn	Corn Stover		
	Corn	seed	Silage	Consumed	Waste	Per cent
	Pounds	Meal	Pounds	Pounds	Pounds	Waste
Jan. 13 to Jan.26	.32	.08	.91	1.21	.38	23.9
Jan.27 to Feb. 9	.38	.08	.58	1.59	.48	23.2
Feb.10 to Feb.23	.46	.08	.60	1.51	.90	37.3
Feb.24 to Mar. 9	.67	.08	.60	1.44	1.01	41.2
Mar. 10 to Mar.16	1.00	.08	.60	1.26	1.56	55.3
Average	.51	.08	.67	1.42	.77	35.1

The experiment had not progressed far when the various rations began to produce marked differences in the appetites of the ewes. Each lot had been getting one pound of silage per head per day for only ten days when Lot 3 which was receiving corn stover began leaving enough silage to justify a reduction of .5 pound per day. The reduction proved to be not too much, for it was about a week before an increase of .1 pound could be made, after which time .6 pound of silage per head per day was fed throughout the experiment. The ration of Lot 3 was composed almost entirely of the corn plant in different forms - silage, stover and grain - furnishing very little if any variety which is believed to be sufficient cause for the lack of appetite for silage. At first the stover

waste amounted to 23.9 per cent, but by the fifth week the loss was 37 per cent which increased during the last week of the experiment to 55 per cent.

When Lot 3 had the silage reduced, Lot 2 was increased gradually to 1.25 pounds of silage which was always eaten with avidity. These ewes would have consumed more silage but it was thought best not to go beyond 1.25 pounds per head per day. Like the stover, the straw was eaten better at the beginning. During the first 4 weeks there was never a waste of 20 per cent, but by the 7th week the loss was 35 per cent and during the last week it reached 50 per cent.

At no time throughout the experiment was the silage fed to Lot 1 varied from one pound per head per day after the ewes had become accustomed to this amount. While the ewes could, in all probability, have been induced to eat more, yet they never manifested the same appetite for silage as the ewes getting oat straw. The clover hay waste was only 19 pounds out of 512 pounds of hay fed, and represented chiefly the foreign matter in the hay.

The corn fed Lot 1 remained constant throughout the experiment at .32 pound per day. Lot 2 received .32 pound per head daily until January 31st when the first increase was made to .4 pound; February 28 the second increase was made to .6 pound, and after March 13th .9 pound of corn was fed daily. Lot 3 received the same corn ration as Lot 2 until February 20th when an increase was made to .6 pound; March 5th the ewes

were eating .8 pound each and when the experiment closed 1.1 pounds were readily consumed. The ewes began lambing March 17th and it was thought best to stop the experiment the 16th. This was at least one week earlier than was counted on at the outset and explains the increase in the ration so near the end of the experiment.

Shelter and Exercise

The ewes were kept in the sheep barn, each lot having a pen about 16' by 10' with large hinged windows that could be opened or closed according to variations in the weather. Adjoining each pen was an open yard about 10' by 20' with a northern exposure. During good weather the ewes were out-of-doors in the daytime. This, however, did not allow the necessary exercise required by breeding ewes or enough to make the experiment entirely comparable to farm conditions. To get more exercise, the ewes were driven back and forth on a paved road between two feed barns, but circumstances did not permit this to be done often enough. As before stated, on Monday, Wednesday and Friday of each week the ewes were driven to the scales a distance of about 25 yards.

Salt, Water and Bedding

The sheep had access to a mixture of salt and tobacco at all times. While actual account was not taken of the

amount eaten, the lot receiving clover hay, or the narrow ration, demanded more than the lots getting straw and stover. Tobacco was eaten quite freely by all ewes and it should be mentioned that two ewes died a few weeks after the experiment closed, and upon examination no stomach worms were found yet nodular disease was present to a slight extent.

The ewes had access to fresh water during the day but a record was not kept of the amount consumed.

To prevent an error from the ewes eating bedding, the straw was put in for a pen of wethers and tramped a day before using it for the ewes. This apparently answered the purpose for not once were the ewes seen eating bedding.

The initial and final weight of the ewes and the gains made are as follows:

TABLE II

Lot 1 - Clover Hay

Average weight of each ewe at beginning	- - - - -	114.8 lbs.
" " " " " " end	- - - - -	124.4 "
" gain " " " for 63 days	- - - - -	9.6 "
" daily gain of" " " " "	- - - - -	0.152"
Calculating .7 pound per week for fetal development		6.3 "
Total gain per head minus allowance for fetal development	- - - - -	3.3 "
Daily gain per head minus allowance for fetal development	- - - - -	0.052"

TABLE II (continued)

Lot 2 - Oat Straw

Average weight of each ewe at beginning	- - - - -	113.7 lbs.
" " " " " " end	- - - - -	117.6 "
" gain " " " for 63 days	- - - - -	3.9 "
" daily gain of" " " " "	- - - - -	0.062 "
Calculating .7 pound per week for fetal development		6.3 "
Total gain per head minus allowance for fetal development	- - - - -	-2.4 "
Daily gain per head minus allowance for fetal development	- - - - -	-0.038 "

Lot 3 - Corn Stover

Average weight of each ewe at beginning	- - - - -	113.7 lbs.
" " " " " " end	- - - - -	116.1 "
" gain " " " for 63 days	- - - - -	2.4 "
" daily gain of" " " " "	- - - - -	0.038 "
Calculating .7 pound per week for fetal development		6.3 "
Total gain per head minus allowance for fetal development	- - - - -	-3.9 "
Daily gain per head minus allowance for fetal development	- - - - -	-0.062 "

The initial weights were about the same for the three lots but the final weights differed somewhat. The gain made by Lot 1 was 9.6 pounds; by Lot 2, 3.9 pounds; and by Lot 3, 2.4 pounds for the entire experiment.

As stated previously, the ewes were expected to lamb

the latter part of March which would have been ten weeks after the experiment started. Since the maintenance ration for breeding ewes should produce sufficient increase in weight to account for the development of the fetus, it was decided to allow .7 pound gain per head per week for this development and feed with this end in view. By deducting 6.3 pounds (.7 pound per week for nine weeks) from the gains of the various lots it will be seen that Lots 2 and 3 did not maintain their initial weights throughout the experiment but lost 2.4 and 3.9 pounds respectively. Lot 1 on the other hand gained 3.3 pounds. The record of the birth weight of the lamb produced is not given, but suffice it to say that the ewes in Lot 1 produced seven lambs weighing 7 pounds each or 9.7 pounds per ewe, Lot 2 seven lambs weighing the same as those of Lot 1, and Lot 3 with four ewes produced 4 lambs weighing 8.9 pounds each. The ewes in Lot 1 being in a more thrifty condition came through the lambing period in better shape and possessed more milk than did the ewes in Lots 2 and 3. One week before the experiment ended ewe No. 142 of Lot 3 aborted and was removed from the test. The cause of this was unknown. The weight of this ewe was 104 pounds which was used in determining the average final weight.

Below is a table showing total feed and digestible nutrients consumed (digestible nutrients used in this thesis are according to Dr. H. P. Armsby as reported in Bulletin No. 84, Pennsylvania Experiment Station).

TABLE III

Total Feed and Digestible Nutrients Consumed

Lot 1 - Clover Hay

	Feed Eaten Pounds	Dry Matter	Crude Fibre	Protein	Carbo- hydrate	Ether Extract
Corn	100.8	89.81	2.12	6.84	66.65	5.01
Oats	3.2	2.85	.30	.27	1.55	.13
Cottonseed Meal	22.0	20.20	1.23	7.73	3.63	2.77
Corn Silage	309.0	79.10	17.92	3.74	45.00	2.72
Clover Hay	493.0	417.57	122.26	26.67	188.08	8.92
	928.0	609.53	143.83	45.25	304.91	19.55

Lot 2 - Oat Straw

Corn	142.2	126.70	2.99	9.66	94.02	7.07
Oats	3.2	2.85	.30	.27	1.55	.13
Cottonseed Meal	22.0	20.20	1.23	7.73	3.63	2.77
Corn Silage	363.6	93.08	21.09	4.40	52.95	3.20
Oat Straw	436.1	395.98	161.36	4.75	168.51	3.31
	967.1	638.81	186.97	26.81	320.66	16.48

Lot 3 - Corn Stover

Corn	155.8	138.82	3.27	10.58	103.01	7.74
Oats	3.2	2.85	.30	.27	1.55	.13
Cottonseed Meal	22.0	20.20	1.23	7.73	3.63	2.77
Corn Silage	205.8	52.68	11.94	2.49	29.96	1.81
Corn Stover	437.6	260.37	86.21	7.88	145.11	2.49
	824.4	474.92	102.95	28.95	283.26	14.94

The above table is based upon the amount of feed consumed. The waste for the various lots was as follows:

Lot 1 - 19 pounds of clover hay or 3.7% of amount fed.

Lot 2 - 201.9 pounds of oat straw or 31.6% of amount fed.

Lot 3 - 237.1 pounds of corn stover or 35.1% of amount fed.

The nutrients consumed in the corn stover were in all probability larger than given in the table since the ewes ate only the leaves and more palatable parts leaving the coarse parts of the stalk as waste. This is also true of the oat straw, only to a less degree. It so happened that the gains made by the various lots were in direct proportion to the total nutrients consumed. Below is a table showing the gains made and the digestible nutrients consumed by weekly periods, also the proportion of concentrates to roughage.

TABLE IV

Average Gains and Digestible Nutrients per 100 lbs. Live Weight by weekly periods, Proportion of Concentrates to Roughage, and Energy Values.

No. of Week	Lot No.	Av. Gain per 100# Live Weight Per Wk.	Dry Matter per 100# Live Weight Per Wk.	Dig. Weight	Nut. per Head	per 100#	Live Weight per Week	Energy Value Calo-ries	Proportion of Concentrates to Roughage
				Pro.	Carb.	E. E.	Total		
1	I	.87	9.7	.63	5.07	.30	6.00	11867	1 : 3.55
1	II	-1.05	9.67	.31	4.92	.22	5.45	11732	1 : 3.31
1	III	- .18	8.13	.38	4.87	.20	5.45	10602	1 : 3.63
2	I	.09	9.93	.75	5.06	.34	6.15	12239	1 : 3.56
2	II	- .88	10.26	.45	5.08	.26	5.79	11383	1 : 3.46
2	III	-1.23	8.13	.49	4.74	.25	5.48	10769	1 : 3.52
3	I	-1.39	10.26	.80	5.21	.35	6.36	12648	1 : 3.64
3	II	.18	11.57	.50	5.70	.31	6.51	12834	1 : 3.78
3	III	- .71	8.98	.54	5.21	.26	6.01	11792	1 : 3.74
4	I	.26	11.35	.86	5.69	.38	6.93	13783	1 : 3.98
4	II	- .36	13.12	.54	6.47	.33	7.34	14415	1 : 4.23
4	III	.27	9.90	.60	5.76	.28	6.64	13001	1 : 3.74
5	I	1.75	12.47	.93	6.18	.40	7.51	14899	1 : 4.43
5	II	2.42	14.32	.55	6.96	.33	7.84	15345	1 : 4.59
5	III	.00	9.47	.57	5.53	.28	6.38	12518	1 : 3.55

TABLE IV (continued)

Average Gains and Digestible Nutrients per 100 lbs.
Live Weight by Weekly Periods, Proportion of Concentrates
to Roughage, and Energy Values.

No. of Lot	Av. Gain	Dry Matter per 100# Live Weight per Week	Digestible Nutrients per 100# Live Weight per Week	Energy Values	Proportion of Concentrates to Roughage
Week No.	per 100# Live Weight per Week	per 100# Live Weight per Week	Pro. Carb. E.E.	Total Calories	
6	I	.60 12.40	.93 6.15 .40	7.48 14842	1 : 4.51
6	II	1.14 14.16	.52 6.15 .31	6.98 13708	1 : 4.08
6	III	.62 9.71	.60 5.78 .30	6.68 13096	1 : 2.83
7	I	1.37 12.65	.94 6.25 .40	7.59 15047	1 : 4.65
7	II	1.56 13.60	.56 6.77 .34	7.67 15066	1 : 4.35
7	III	.45 10.13	.64 6.10 .33	7.07 13913	1 : 2.51
8	I	1.10 12.81	.95 6.32 .40	7.67 15196	1 : 4.64
8	II	.17 13.50	.60 6.93 .37	7.90 15550	1 : 4.14
8	III	1.15 10.64	.68 6.52 .37	7.57 14936	1 : 2.08
9	I	4.01 13.40	.98 6.57 .41	7.96 15754	1 : 5.16
9	II	.25 13.11	.65 7.05 .42	8.12 16052	1 : 3.73
9	III	1.75 9.09	.78 6.96 .44	8.18 16238	1 : 1.47

Nothing definite can be drawn from these figures yet the total digestible nutrients increased gradually throughout the experiment. It is interesting to note the relation of concentrates to roughage. Lot 1 which made a gain of 9.6 pounds did so with a ration varying from 1 : 3.5 at the beginning to 1 : 5.16 at the end of the experiment. Lot 2 gained 3.9 pounds with a ration varying from 1 : 3.3 at the beginning to 1 : 4.59 during the fourth week and 1 : 3.73 at the end. With Lot 3 the proportion remained about stationary for five weeks at 1 : 3.63, but during the last four weeks the grain was greatly increased making the proportion 1 : 1.47 at the end. The average proportion of concentrates to roughage was as follows:

Lot 1 - - - 1 : 4.24

Lot 2 - - - 1 : 3.25

Lot 3 - - - 1 : 2.83

The lack of uniform results when dealing with short periods is clearly shown in Table IV.

TABLE V

Average Feed Consumed Daily Per Ewe

Lot Number	Feed Eaten Pounds	Dry Matter	Crude Fibre	Protein	Carbo- hydrate	Ether Extract
Lot 1 - Clover Hay	2.94	1.93	0.45	0.14	0.97	0.062
Lot 2 - Oat Straw	3.07	2.03	0.59	0.085	1.02	0.052
Lot 3 - Corn Stover	2.66	1.54	0.33	0.094	0.92	0.048

This table does not take into account the feed wasted, so in order to get the amount necessary for the original ration the hay should be increased about 4%, straw 32% and the stover 35%. The grain ration of Lot 1 was stationary throughout the experiment while Lots 2 and 3 required an increase in the grain for maintenance. The ewes fed clover hay were more thrifty during the whole course of the experiment than the ewes getting straw and stover. There was little difference between Lots 2 and 3 yet it was apparent that something could be done to improve their condition.

TABLE VI

Average Weight of Ewes, Gain and Digestible Nutrients per 100# Live Weight, Nutritive Ratio and Energy Values.

	Average Weight Ewes	Average Daily Gain per 100# Live Weight	Dry Matter per 100# Live Weight	Digestible Nutrients per 100# Live Weight			Nutri- tive Ratio	Energy Values Calories
				Pro-	Carbo- hydrate	Ether Ex- tract		
Lot 1 Clover Hay	119.6	.127	1.61	.117	.811	.052	1:7.93	1945.5
Lot 2 Oat Straw	115.7	.054	1.75	.073	.881	.045	1:13.38	1964.5
Lot 3 Corn Stover	114.9	.033	1.34	.082	.800	.042	1:10.91	1817.8

It should be remembered when studying the above table that Lots 2 and 3, when considering fetal development, were fed at a slight loss in body weight. Comparing these values with those given in Bulletin 111 of this Station where a maintenance ration is reported for breeding cows, it is seen that less dry matter, considerable more protein, about the same amount of carbohydrates and about double the quantity of ether extract were found necessary for sheep in this experiment. The average protein requirement agrees very closely - a little higher, to what Cook at the Pennsylvania Station found necessary for maintenance of wethers of about the same age.

In the following table is given the dry matter and digestible nutrients required for breeding cows and wethers as compared with the findings of this experiment and the Wolff-Lehman standard.

TABLE VII
Comparison of Maintenance Rations

	Dry Matter	Digestible	Nutrients	Nutritive	
	per 100#	per 100#	Live Weight	Ratio	
	Live Weight	Protein	Carbo- hydrates	Ether Ex- tract	
Breeding Cows ¹	1.77	.057	0.85	.024	1 : 15.9
Wethers ²	- -	.0816	1.186	- -	1 : 14.5
Breeding Ewes ³	1.57	.091	0.831	.046	1 : 10.3
Wolff-Lehman Standard	1.80	.084	0.80	.010	1 : 9.79

1 - Bulletin 111, Illinois Experiment Station. Average of three rations.

2 - Pennsylvania Station Report, 1901, p. 282.

3 - Average of the three rations reported in this experiment on page 19.

While these results cannot be directly compared, it is interesting to note the requirement for the various classes of animals. Lot 1 in this experiment received a ration with a nutritive ratio 1 : 7.9 which to some extent explains the large amount of protein in the above table. Furthermore, when cottonseed meal is fed the ether extract cannot be limited to the small amount fed in the other experiments.

Financial Statement

The prevailing prices of feedstuffs during the winter of 1908 and 1909 were as follows:

Corn - - - - -	\$.60 per bushel
Oats - - - - -	.45 " "
Cottonseed meal - -	28.00 " ton
Corn silage - - - -	3.00 " "
Corn stover - - - -	5.00 " "
Oat straw - - - - -	6.00 " "
Clover hay - choice	10.00 " "

Since the price of feed is quite a variable factor, the cost of the rations is not calculated at the above prices but the following tables have been prepared giving different prices for corn, hay, straw and stover.

TABLE VIII

Financial Statement

Lot 1--Clover Hay

Cost of Corn		\$.40		\$.50		\$.60		\$.70	
Cost of keeping one ewe		1 day	180 days	1 day	180 days	1 day	180 days	1 day	180 days
		\$	\$	\$	\$	\$	\$	\$	\$
Clover hay	\$6 per ton.	.0096	1.73	.0101	1.82	.0107	1.93	.0113	2.03
"	" \$8 "	.0111	2.00	.0117	2.11	.0123	2.21	.0128	2.30
"	" \$10 "	.0127	2.28	.0134	2.41	.0139	2.50	.0144	2.58
"	" \$12 "	.0142	2.56	.0149	2.68	.0154	2.77	.0160	2.88
"	" \$14 "	.0158	2.84	.0164	2.95	.0170	3.06	.0175	3.15
"	" \$16 "	.0174	3.13	.0180	3.24	.0185	3.33	.0191	3.43

Lot 2 - Oat Straw

Oat Straw \$2 per ton		.0081	1.46	.0089	1.60	.0097	1.75	.0105	1.89
" " \$4 "	"	.0101	1.82	.0109	1.97	.0117	2.11	.0125	2.25
" " \$6 "	"	.0121	2.18	.0129	2.32	.0137	2.46	.0145	2.61

Lot 3 - Corn Stover

Corn Stover \$2 per ton.		.0071	1.28	.0080	1.44	.0088	1.58	.0097	1.74
" " \$4 "	"	.0092	1.66	.0101	1.82	.0110	1.98	.0119	2.14
" " \$6 "	"	.0114	2.05	.0123	2.21	.0132	2.38	.0141	2.54

In this table the cost of oats, cottonseed meal and silage consumed was computed from prevailing prices for the year as given above. The cost of the daily ration of the ewe and the cost of keeping one ewe 180 days or six months has been calculated with corn at 40, 50, 60 and 70 cents per bushel; hay at 6, 8, 10, 12, 14, and 16 dollars per ton; straw and stover at 2, 4, and 6 dollars per ton.

In general when breeding ewes are kept on the farm the fleece is expected to pay the keep of the flock for the year. At the present time it would cost \$5.00 to maintain one ewe a year on the ration as received in Lot 1, \$4.90 in Lot 2 and \$4.40 in Lot 3. It might appear at first sight that such cost of maintenance would be prohibitive to sheep keeping on Illinois farms and this would be the case if conditions could not be altered in any way. It is often necessary to utilize at home a crop of hay that could not be marketed owing to it being damaged at curing time. On most farms in Illinois straw and stover have little or no commercial value and would cost for sheep feed only the labor of preparing and feeding. When corn can be had for 40¢ per bushel and clover hay at \$6.00 per ton, the flock can be maintained one-half of the year on dry feed for the price of a good clip of wool. Judging from this experiment it would not be best for one to feed only straw or stover as roughage to sheep for a long period, yet in conjunction with clover hay there is not the least doubt in the writer's mind but that the ration would be equally

as efficient and much less expensive than clover hay alone. Because of the limited number of ewes fed and the short time they were on experiment it is not possible to consider the results entirely conclusive.

Summary

1. The ration containing clover hay was most efficient in two ways:

1st. Much less grain was required.

2nd. The ewes were in much better thrift throughout the experiment.

2. The lot receiving oat straw had decidedly the best appetite for silage but required much more grain than Lot 1.

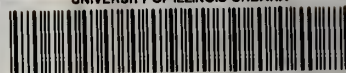
3. When silage is fed with corn stover and shelled corn there seems to be too much of the corn plant present in the ration and the appetite for silage is thereby reduced.

4. It would not be good management to attempt to maintain a flock for any length of time with only corn stover or oat straw for roughage.





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